

## *Parhyale explorator*, a new species of talitroid amphipod from the bay of Arcachon, France

by Aitor ARRESTI

**Abstract.** — *Parhyale explorator* n. sp., is a new species of talitroid amphipod discovered in the Bay of Arcachon (France). *P. explorator*'s most distinguishing features are the long tufts of plumose setae ventrally on antenna 2 which make it easy to differentiate from other species of the genus. This article presents a detailed description of the new species together with a discussion of amphipod systematics and the key, proposed by BARNARD (1979), that is developed using all species found to date.

**Résumé.** — Une nouvelle espèce d'amphipode talitride, *Parhyale explorator*, est décrite du Bassin d'Arcachon (France). Elle est spécialement caractérisée par la présence de longues touffes de soies pennées en position ventrale sur l'antenne 2. L'auteur donne une nouvelle clef de détermination des espèces du genre, dérivée de celle de BARNARD (1979), et quelques commentaires sur la systématique du genre *Parhyale*.

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### INTRODUCTION

BULYCHEVA (1957) raised the family Talitridae Costa to Superfamily rank (Talitroidea) and established two new families : the Hyalidae and Hyaellidae. This new structure is based on ecological criteria. The family Talitridae covers the terrestrial genus, with the family Hyalidae containing exclusively marine species while the family Hyaellidae consists mainly of freshwater species but also some marine species.

Despite the fact that the genus *Parhyale* was described in 1897 by STEBBING (monotype *Parhyale fasciger*), it is relatively unknown because of the very small differences between it and other closely related genera. Many of its species have been described as belonging to the genus *Hyale* Rathke, 1837, *Allorchestes* Dana, 1849, and *Parallorchestes* Shoemaker, 1941, as a result of these similarities. These errors in identification are not surprising if one takes into account that the only difference between the genera *Parhyale* and *Hyale* is the presence of a more or less vestigial endopodite in uropod 3 of the former, an endopodite in uropod 3 of *Parhyale*, that sometimes becomes fused with the peduncle. The sole difference between the genera *Parhyale* and *Parallorchestes* rests in the biarticulation of the palp on maxilla 1 of *Parallorchestes*. Although this last case is under revision, it seems to support the opinion of GURJANOVA (1951 : 813) and BULYCHEVA (1957 : 78) that only one genus is involved (STOCK, 1987 : 168).

As stated above the difference between genera is very small and as a result the confusion between their species is large. After a deep study of literature and the publication of KRAPP-

SCHICKEL (1974), the author agrees with BARNARD's comments (1979 : 120) that an exhaustive examination of tropical waters collections is necessary in order to recheck that they all belong to the genus *Parhyale*, and also to avoid their erroneous inclusion in groups such as *P. hawaiiensis* and *P. fascigera* complex.

The three Mediterranean species of *Parhyale* are already well-defined (KRAPP-SCHICKEL, 1974). *P. penicillata* Schoemaker, 1956, has been raised to the category of species lastly, having been included up to then as a subspecies of *P. fascigera* Stebbing, 1897.

Regarding *P. inyacka* K. H. Barnard, 1916, BARNARD (1977 : 298; 1979 : 127) suggests that it is possible to differentiate the Atlantic and the Pacific populations of *P. hawaiiensis* (Dana, 1853), putting *P. inyacka* into the former category by virtue of the difference in the posterior acclivity of coxa 1. STOCK (1987 : 168, 180), agrees with SHOEMAKER's (1956) remarks that *P. inyacka* cannot be separated from Pacific Ocean specimens of *P. hawaiiensis*.

*P. ? zibellina* Derzhavin, 1937, was originally described as belonging to the *Parhyale* genus but then later included in *Parallorchestes*. As the palp of maxilla 1 is unknown, *P. ? zibellina* cannot be confirmed as a member of *Parallorchestes* and in some of its appearance it better fits

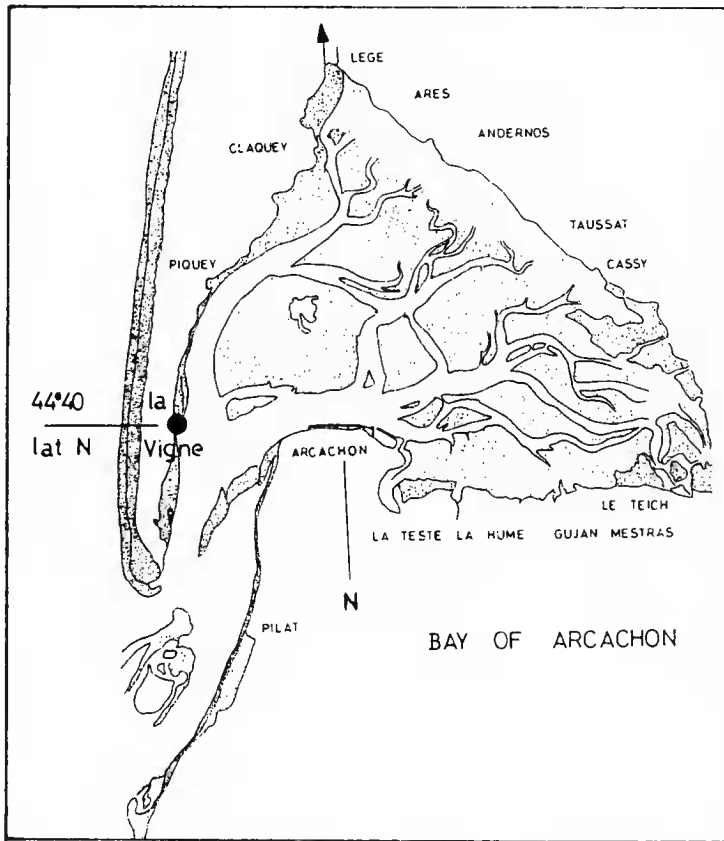


FIG. 1. — Geographic situation of La Vigne beach (Bay of Arcachon).

into the *Parhyale* genus (BARNARD, 1979 : 119). As the difference between the genera is very small, *Parallorchestes* may possible be considered synonymous with *Parhyale*, as GURJANOVA (1951 : 813) and BULYCHEVA (1957 : 78) believed.

The species *P. ? iwasai* Shoemaker, 1956, was believed to be closely related to *P. hawaiiensis*. At present, the inner ramus of uropod 3 remains to be discovered which leaves this relationship in doubt. However, if one were to include it in the genus *Parhyale* there are differences to separate it from *P. hawaiiensis* (BARNARD, 1979 : 121).

The status of the species *Parhyale* sp. cf. SIVAPRAKASAM (1970) continues to be unclear. BARNARD (1979 : 126) and STOCK (1987 : 180) recognized it as a species distinct from *P. hawaiiensis*. However STOCK (1987 : 180) asserts that it is very close to *P. basrensis* Salman, 1986, and therefore also comes close to being included in the *P. hawaiiensis* complex. The inclusion of this and the other species of the genus *Parhyale* in the *P. hawaiiensis* complex is a much debated point. *P. basrensis* Salman, 1986, *P. penicillata* Shoemaker, 1956, and *P. multispinosa* Stock, 1987, or even doubtful recordings such as *Parhyale* sp. of BULYCHEVA (1957) (STOCK, 1987 : 169, 180), all present notable differences. However, all of these are very close related to the *P. hawaiiensis* complex.

## Superfamily TALITROIDEA

### Family HYALIDAE

#### PARHYALE Stebbing, 1897

*Parhyale* Stebbing, 1897; STEBBING, 1906.  
*Hyaloides* Schellenberg, 1939.

#### ***Parhyale explorator* n. sp.**

(Figs. 2-5)

MATERIAL EXAMINED. — Holotype male; allotype female; paratypes 10 males and 2 females; La Vigne, Bay of Arcachon, France (fig. 1); intertidal, 0 metre, on the sand of the semiclosed beach under a heavy substrate; July 22, 1985.

Paratypes : adult specimens used for the description (2 males and 1 female) were mounted for microscopy and deposited in the Laboratory of Zoology of the University of the Basque Country.

Moreover, 6 males and 1 female are deposited in the Laboratory of Zoology of the University of the Basque Country; 1 male in the Carcinology Laboratory of Natural History Museum of Paris and 1 male and 1 female in the Laboratory of Dr. RUFFO.

#### DESCRIPTION

##### *Male*

Total length 9.2 mm (fig. 2a). Head without rostrum. Lateral cephalic lobe broad and a little rounded, truncate vertically. Black eyes, medium size and kidneyshaped with many ommatidia.

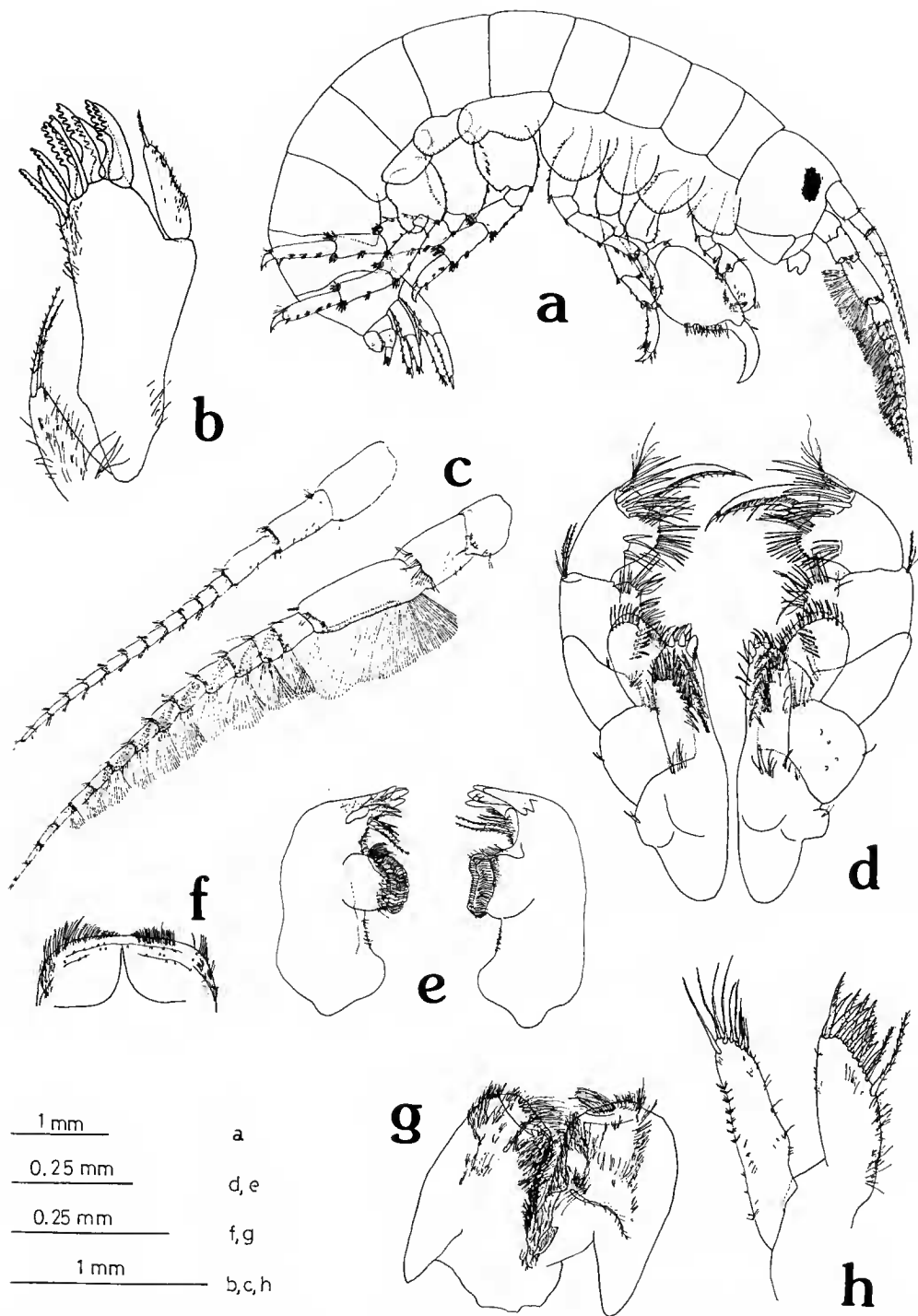


FIG. 2. — *Parhyale explorator* n. sp., male 9.2 mm : a, lateral view ; b, maxilla 1 ; c, antennae 1 and 2 ; d, maxillipeds ; e, mandibles ; f, upper lip ; g, lower lip ; h, maxilla 2.

Antenna 1 (fig. 2c) reaching well beyond posterior margin of 2nd peraeomere, and about 1/2 length of antenna 2. Peduncle 3-segmented; flagellum 12-segmented, each article with short setae distally; aesthetascs well developed; flagellum articles 1 and 9 each with 1 aesthetasc, articles 2-8 each with 2 aesthetascs, and the last three articles (10-12) without aesthetascs.

Antenna 2 (fig. 2c) of medium length, peduncle thick; article 5 of peduncle and first 10-11 flagellar articles heavily setose posteriorly, bearing long tufts of plumose ventral setae.

Upper lip rounded (fig. 2f), broad, unilobate, with 2 rows of spinules and numerous short setules.

Mandible without palp (fig. 2e); molar process strong, triturative. Lacinia mobilis with three different pieces; incisor with 6-7 teeth. Spine row well developed.

Maxilla 1 (fig. 2b), inner plate short, with 2 long plumose apical setae; outer plate broad with 6 strong serrated spines and 3 slender ones. Palp uniarticulate, constricted in the middle with 1 short apical seta.

Maxilla 2 (fig. 2h), inner plate with long apical setae. Outer plate with 9 slender apical setae and another 9 thin plumose setae; 2 long plumose setae present in the medioventral zone.

Maxilliped (fig. 2d), inner lobe reaching 1/3 along length of 2nd article of palp, with 3 apical teeth, and few subterminal setae. Present plumose setae on inner margin and few setae on surface; outer plate longer than inner one, with 2 rows of setae extending from apex to middle part of inner margin where they become irregularly arranged. Palp 4-segmented, article 2 with 2 plumose apical setae on outer margin; article 3 with long setae on apicolateral margin and 2 plumose setae on outer margin; 4th article unguiform, with terminal spine full of setae on inner margin.

Lower lip bilobulate (fig. 2g), with short setae on outer margin, reaching the inner margin. Inner lobe with 2 plumose setae; outer lobe truncated apically.

Gnathopod 1 (fig. 3j) basis broad distally with few setae on posterior margin and with a medioventral process (middle part of distal margin), being serrated up to the posterior margin; ischium short, with a rounded process on anterior margin and another medioventrally; present 6 plumose setae on distal part of posterior margin; merus, with posterodistal angle quadrate and bearing 5-7 plumose setae; carpus broader distally and with 2 rows of strong plumose and serrated setae arranged distally and posteriorly; last 3 setae not plumose. Propodus broad, subquadrate; anterior margin naked and posterior on with a little depression cover of plumose setae (except last 3 ones), that increase in length towards dactylus; palm margin spiny with numerous short and thin spines, subtransverse with 2 slightly enlarged spines in tandem at defining corner. Posterior margin with few setae distally, bearing individual plumose setae on palm margin and on anterior margin of propodus, and a tuft of long, not plumose, setae on the anterodistal margin. Dactylus short, strong and curved; inner margin with many setae, outer margin with only 1 plumose seta on the basis.

Coxal plate subquadrate, rounded apically, as high as broad and posterior margin excavate with a sharp process.

Gnathopod 2 (fig. 3e, 3f, 3g), basis broad distally with few spines on anterior margin and 4-5 curved spines on posterior margin and with a medioventral process, being serrated up to the posterior margin; ischium short with a rounded process on anterior margin and another medioventrally; merus with sharp posterodistal angle and with thin and short setae, carpus, small triangular plate, with strong spine distally on anterior margin and a short obtuse process

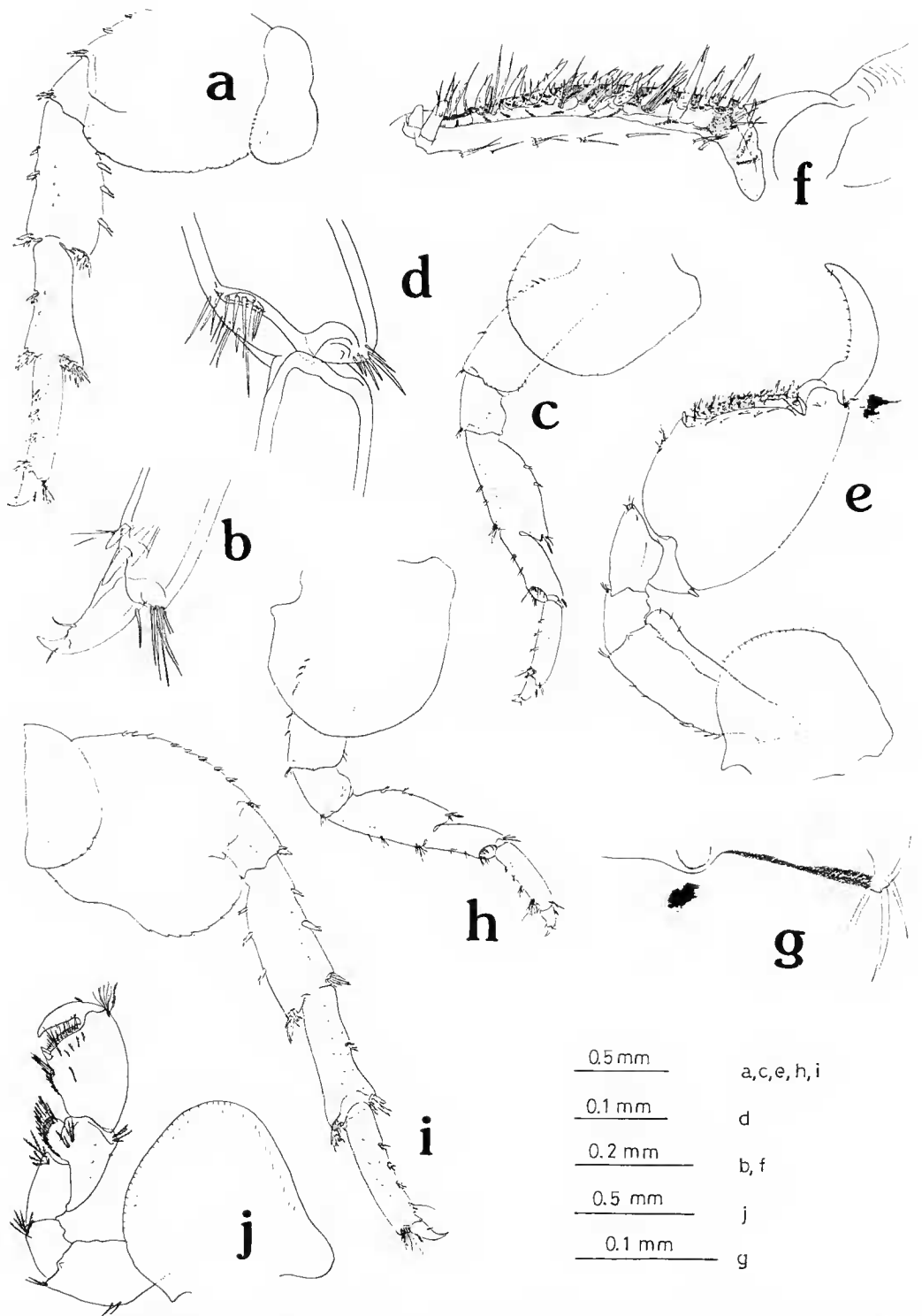


FIG. 3. — *Parhyale explorator* n. sp., male 9.2 mm : a, peraeopod 6; b, detail, propodus of peraeopod 6; c, peraeopod 3; d, detail, carpus of peraeopod 3; e, gnathopod 2; f, detail, palm margin; g, detail, basis of gnathopod 2; h, peraeopod 4; i, peraeopod 7; j, gnathopod 1.

on posterior margin, between merus and propodus; propodus eggshaped, broad and well developed. Anterior margin naked; small depression on posterior margin reaching 2 slightly enlarged spines at defining corner; palm margin spiny with numerous short spines and bearing 2 rows of long and well defined spines, and a lot of short setae. Dactylus strong, with short setae on inner margin, and 1 plumose seta on outer margin.

Coxal plate subquadrate, rounded apically, as high as broad and posterior margin excavate with a sharp process.

Peraeopods 3-4 (fig. 3c, 3d, 3h), long and slender, subequal; basis long with naked anterior margin and thin spines on the posterior margin, with a rounded medioventral process, being serrated up to the posterior margin; ischium with a rounded process on anterior margin and another medioventrally; merus with long plumose setae on anterodistal margin; carpus with posterodistal margin truncated and bearing setae; propodus slender, naked on anterior margin and with 4 escalonated spines on posterior one; dactylus strong with 1 plumose proximal seta on anterior margin.

Coxal plate 3 subquadrate, rounded apically, higher than broad and with rectangular angle on posterior margin.

Coxal plate 4, similar, with a sharp process on posterior margin.

Peraeopod 5 (fig. 4a, 4b) robust and spiny on anterior margin. Shorter than peraeopods 3 and 4; basis broad and rounded, with rounded process posteroventral, too. Posterior margin undulate and anterior one spiny; small tubercles on merus, carpus and propodus; ischium with rounded process on posterior margin and another medioventral; merus spiny on both margins and especially on distal part; carpus without spines on posterior margin; propodus slender and naked on posterior margin; dactylus with only 1 short plumose seta on outer margin.

Coxal plate big, bilobulate unequally.

Peraeopod 6 (fig. 3a, 3b) robust and spiny on anterior margin; basis higher than broad, posterior margin undulate, and anterior one, spiny, with rounded process posteroventrally; small tubercles on merus, carpus and propodus; ischium with a rounded process on posterior margin and another medioventral; merus spiny on both margins, and especially on distal part; carpus spiny on anterior margin, and especially on distal part like merus; propodus slender and naked on posterior margin and spiny on anterior margin; a tuft of long setae present on posterodistal part; dactylus with only 1 short plumose seta on outer margin.

Coxal plate small and not very high, bilobulate unequally.

Peraeopod 7 (fig. 3i) robust and spiny on anterior margin; basis higher than broad, with strong depression on posterior margin; anterior margin spiny; with a rounded process posteroventral; small tubercles on ischium, merus, carpus and propodus; ischium with rounded process on posterior margin, and another medioventral; merus spiny on both margins and especially on distal part; carpus naked on posterior margin; propodus slender and naked on posterior margin, and spiny on anterior one with a tuft of long setae posterodistally; dactylus with only 1 short plumose seta on outer margin.

Coxal plate hemispheric, not very high.

Epimeral plate 1 rounded distally; epimeral plate 2, little sinuous and with a posterodistal angle subquadrate; epimeral plate 3 (fig. 4e), with a strong depression on middle part, sinuous and with subquadrate posterodistal angle.

Urosome (fig. 4g, 4i, 4j, 4k); uropod 1 (fig. 4k), peduncle robust and longer than rami,

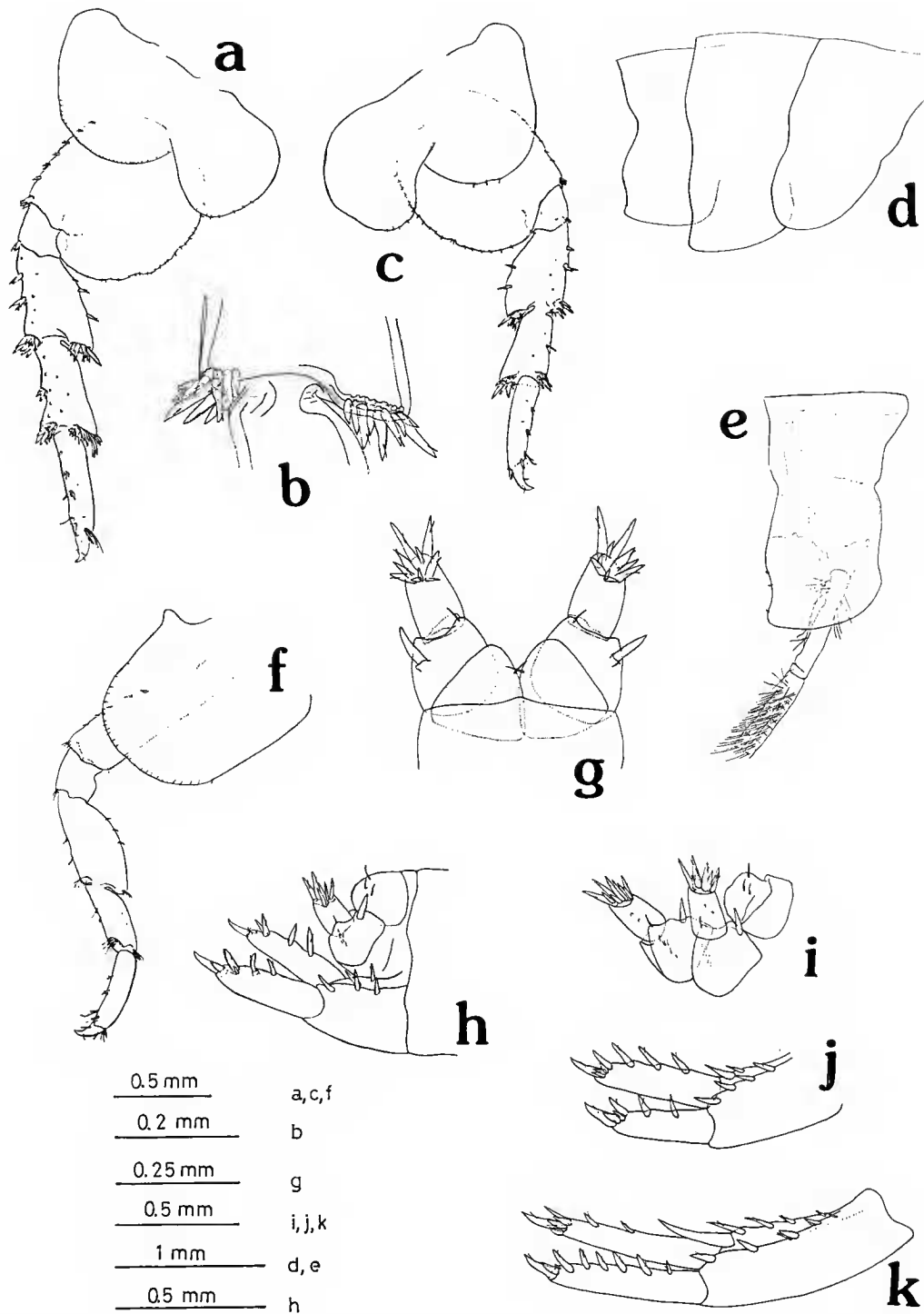


FIG. 4. — *Parhyale explorator* n. sp. : a, peraeopod 5 of male; b, detail, carpus of peraeopod 5 of male; c, peraeopod 5 of female; d, epimeral plates of female; e, epimeral plate 3 of male; f, peraeopod 3 of female; g, telson and uropods 3 of male (dorsal view); h, telson and uropods 2 and 3 of female (lateral view); i, j, k, uropods 3, 2 and 1 of male (lateral view).



with 4 dorsal spines and 1 slightly enlarged spine apicolateral; rami slender, spiny dorsally (6 on outer ramus and 2 on inner one), and with a robust spine group apically (6 on inner ramus and 3 on outer one).

Uropod 2 (fig. 4j) shorter than uropod 1; peduncle robust and spiny dorsally (4 spines on outer margin and 2 on inner margin); rami subequal and spiny, 3 and 4 dorsal spines and shorter than peduncle; rami present robust spines group apically (5 on inner ramus and 4 on outer one).

Uropod 3 (fig. 4g, 4i) shorter than uropod 2; peduncle broad with 1 strong spine apically; outer ramus well defined and a little longer than peduncle; present 8-10 contiguous spines apically; inner ramus poorly defined and fused to peduncle, with 1 apical seta.

Telson cleft (fig. 4g), with triangular lobes and each one bearing 1 dorsal seta.

### *Female*

Total length 9 mm (fig. 5a). Head, lateral cephalic lobes and eyes similar to those of male.

Antenna 1 (fig. 5b), only a little shorter than antenna 2; flagellum 12-segmented and aesthetascs well developed; flagellum articles 1, 9 and 10 each with 1 aesthetascs, articles 2-8 each with 2 aesthetascs, and the last 2 articles (11 and 12) without aesthetascs.

Antenna 2 (fig. 5b) similar in length to antenna 1; article 5 of peduncle and first 4-5 flagellar articles heavily setose posteriorly, bearing long tufts of plumose ventral setae.

Gnathopod 1 (fig. 5c), basis broad distally with 2 slender setae on posterior margin and with medioventral process, being serrated up to the posterior margin; ischium short, with a rounded process on anterior margin; merus, posterodistal angle quadrate and with 7-9 plumose setae; carpus with plumose setae on anterodistal margin, posterior lobe well developed and with 2 rows of strong plumose setae and serrated ones arranged distally and posteriorly; last 2-3 setae not plumose; propodus subrectangular, anterior margin naked and with a little depression cover of plumose setae on posterior margin that increase in length towards dactylus; palm margin spinose, setose and with 2 slightly enlarged spines in tandem at defining corner; present few individual plumose setae on posterior margin and a tuft of not plumose setae anterodistally; dactylus with 1 short plumose seta on outer margin.

Coxal plate rectangular, higher than broad and with a sharp process on posterior margin.

Gnathopod 2 (fig. 5e, 5f, 5i) larger than gnathopod 1, but very much smaller than that of male; basis broad distally and with few setae on anterior margin; long seta present on posterior margin, and a rounded process medioventrally, being serrated up to the posterior margin; ischium with a rounded process on anterior margin and another medioventral; merus, with sharp posterodistal angle and with long plumose setae; carpus with posterior lobe well developed bearing serrated process and plumose setae on posterior margin that increase in length towards propodus; propodus subquadrate with a setae tuft anterodistally; posterior margin with a little depression bearing setae that increase in length towards dactylus; palm margin denticulate, with few setae, and with 2 slightly enlarged spines in tandem at defining corner; individual plumose setae present on outer margin of propodus; dactylus slender and with 1 plumose seta on outer margin.

Coxal plate subquadrate, rounded apically, higher than broad and with a sharp process on posterior margin.

Peraeopods 3-4 (fig. 4f, 5h), similar to those of male, long and slender; basis with a rounded process medioventral, being serrated up to the posterior margin; ischium with a

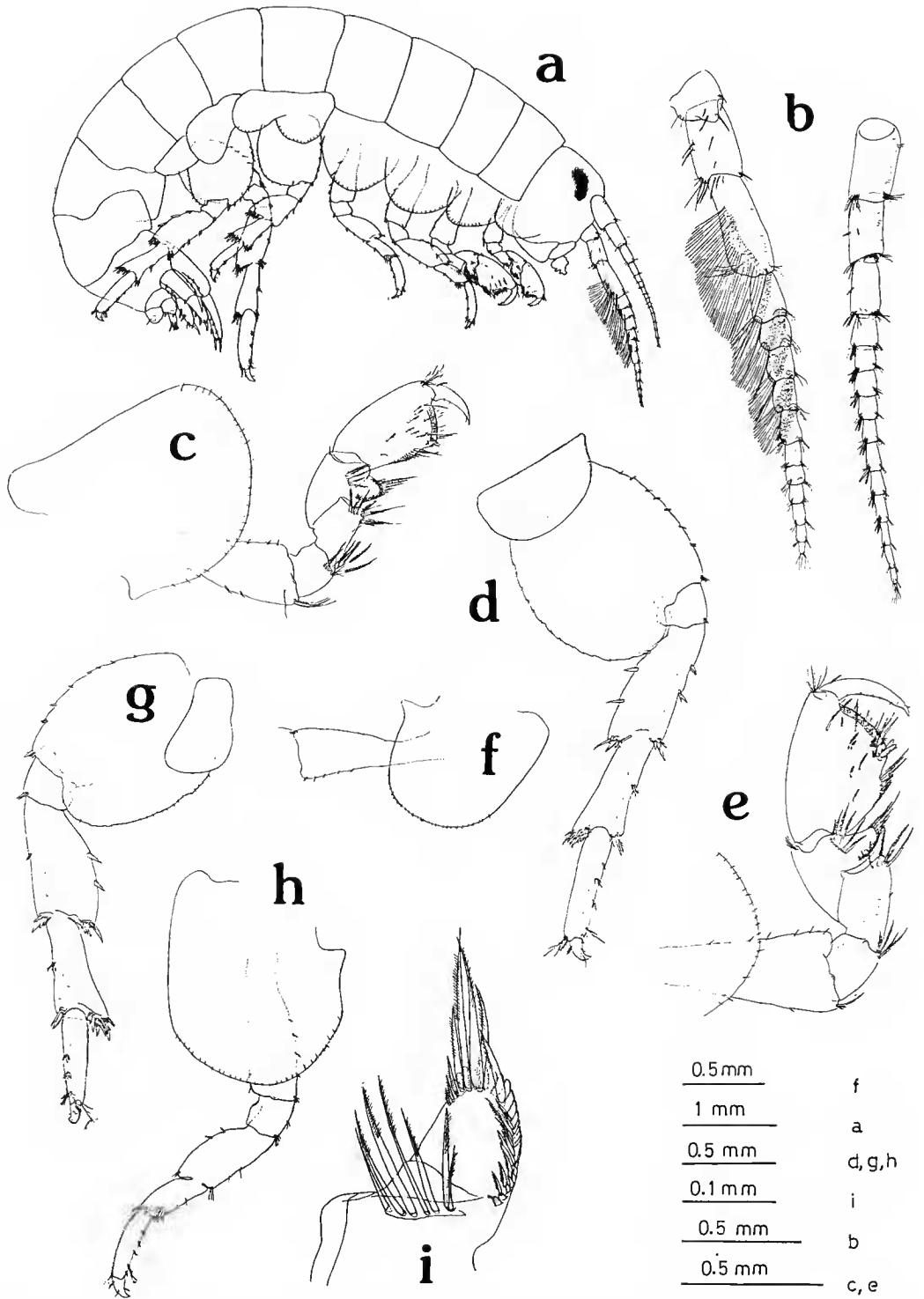


FIG. 5. — *Parhyale explorator* n. sp., female 9 mm : a, lateral view; b, antennae 1 and 2; c, gnathopod 1; d, peraeopod 7; e, gnathopod 2, coxal plate 2; g, peraeopod 6; h, peraeopod 4; i, detail, carpus of gnathopod 2.

rounded process on anterior margin too, and another medioventral; carpus truncate posterodistally and with few setae; propodus naked on anterior margin and spiny on posterior one; dactylus with only 1 plumose seta on outer margin.

Coxal plates similar; rectangular, higher than broad and with a sharp process on posterior margins.

Peraeopods 5-6-7 (fig. 4c, 5g, 5d), robust and spiny, similar to those of male; basis broad, posterior margin sinuous and anterior one, spiny; rounded process posteroventrally present; ischium with a rounded process on posterior margin too, and another medioventral; merus spiny on both margins, and especially on distal margin; carpus and propodus spiny on anterior margin and naked on posterior one; dactylus with only 1 plumose seta on outer margin.

Coxal plate 5 big, bilobulate unequally. Coxal plate 6 small, not very high and bilobulate, and coxal plate 7 hemispheric and not very high.

Epimeral plates (fig. 4d), similar to those of male.

Urosome (fig. 4h) similar to that of male, but little spiny. Uropod 1, peduncle spiny dorsally (3 spines on inner margin and 4 on outer one), bearing 1 enlarged apicolateral spine; rami shorter than peduncle with 1 dorsal spine on inner margin and 3 on outer margin, and an apical spines groups; uropod 2, with 2 dorsal spines on inner and outer margins of peduncle; rami with 3 dorsal spines and an apical spine group; uropod 3, peduncle broad with strong spine apically; outer ramus well defined and with contiguous spines group apically; inner ramus poorly defined and fused to peduncle, with 1 apical seta.

Telson cleft, with triangular lobes and each one bearing 1 dorsal seta.

COLORATION. — When live, both males and females have a yellow translucent colour and black eyes. Preserved in alcohol, their colour changes to a dull and opaque white. The eyes do not change.

LENGTH AND SEXUAL DIMORPHISM. — The species *P. explorator* n. sp. has the characteristic medium length of the family Hyalidae. The average length of captured specimens is 11 mm for males and 9 mm for females. Sexual dimorphism is observed in gnathopod 2, in the length of antennae and the abundance of setae on the antennae, in the form of the posterior margin on the basis of peraeopod 7 and in the number of spines on all appendages.

#### DISCUSSION

The species *Parhyale explorator* n. sp. is mainly distinguished from the other species of the genus by the long tufts of plumose setae on the fifth article of the peduncle and on the first flagellar articles of antenna 2. It is also distinguished from *P. plumicornis* (Heller, 1867), *P. ? zibellina* and *P. ? iwasai* by the existence of apical contiguous spines on the outer ramus of uropod 3, from *P. fascigera*, *P. plumicornis*, *P. ? zibellina*, *P. hawaiiensis*, *P. penicillata*, *P. sp.* of BULYCHEVA, *P. basrensis* and *P. multispinosa* by inner ramus of uropod 3 which is poorly defined and fused to the peduncle and from *P. ? iwasai*, *P. hawaiiensis*, *P. basrensis* and *P. multispinosa* by the propodus of peraeopod 7 which is naked on the posterior margin. It is distinct from *P. ? zibellina*, *P. eburnea* Krapp-Schickel, 1974, *P. aquilina* (Costa, 1853) and *P.*

*basrensis* because it possesses an apicolateral enlarged spine on peduncle of uropod 1, from *P. eburnea*, *P. penicillata* and *P. fascigera* because of strong dorsal spinulation of the rami of uropods 1 and 2. From *P. plumicornis* because of the presence of a short and stout process on the carpus of gnathopod 2 of the male, and from *P. sp.* of BULYCHEVA because it exhibits a rounded posteroventral lobe on the basis of pereopod 7.

Finally, the palp of maxilla 1 of *P. explorator* presents a weak depression on its outer side, which is not a constriction. This distinguishes it from those species with both sides smooth e.g. *P. penicillata*, *P. plumicornis*, *P. basrensis*, *P. hawaiiensis* and *P. sp.* of BULYCHEVA and from those species with a weak constriction, namely *P. eburnea*, *P. fascigera* and *P. multispinosa*, and from those which show a strong medial constriction such as that found in *P. ? iwasai* and *P. aquilina*.

### BIOGEOGRAPHICAL CONSIDERATIONS

*Parhyale explorator* is the fifth species of the genus reported in the Atlantic Ocean, after *P. aquilina*, *P. fascigera*, *P. hawaiiensis*, and *P. multispinosa*, and the first in the North Atlantic Ocean (fig. 6).

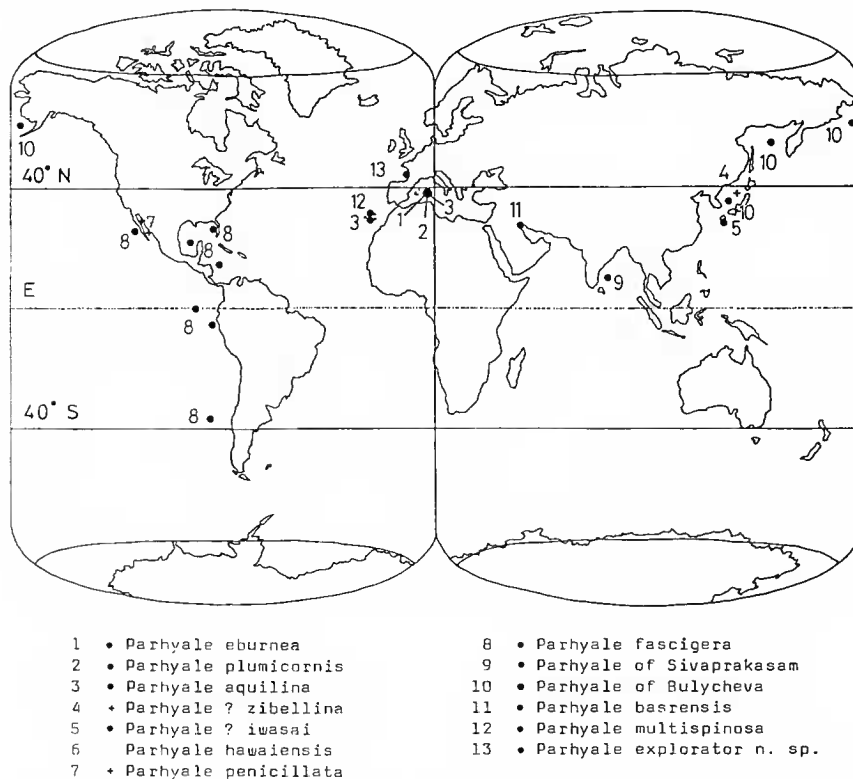


FIG. 6. — World distribution to the species of genus *Parhyale*. \* Distribution of *P. hawaiiensis* is not indicated, because the species is apparently pantropical in shallow water (BARNARD, 1979).

Several species of *Parhyale* offer a very point specific geographical distribution as is the case with *P. eburnea* and *P. plumicornis* which are found only in the Mediterranean Sea (KRAPP-SCHICKEL, 1974), or *P. multispinosa* in the Jameos del Agua Lava Tunnel (Lanzarote) (STOCK, 1987), while other species seem to be more widely distributed. This is the case with *P. fascigera* which can be found on the western American seaboard, the Gulf of Mexico and the Caribbean Sea. Another example is *P. hawaiiensis*, a pantropical species which lives in shallow waters of both the Atlantic and Pacific Oceans (SHOEMAKER, 1956; BARNARD, 1977, 1979).

However, an apparently wide distribution might be no more than the imperfect or incomplete separation among species. This was BARNARD's opinion (1979 : 120) when he considered that *P. hawaiiensis* and *P. fascigera* constitute groups of species. This hypothesis seems to be confirmed by the discovery of the most recent additions to the genus, *P. basrensis* and *P. multispinosa* which are closely related to *P. hawaiiensis*, and by the new status given to *P. penicillata* (BARNARD, 1979 : 123). Most of the species of the *Parhyale* genus are found between parallels 40 North and 40 South. The species *P. fascigera* has been reported in the Juan Fernandez Islands (40 S) making it the species with the most southerly habitat. However not all of the species of the genus are found between these north and south boundaries. *P. sp.* of BULYCHEVA has been sighted farther than the 50 N, and the new species *P. explorator* (44°40 N). All the aforementioned facts seem to indicate a predilection of this genus for warm and tepid waters (BARNARD, 1979 : 119). The precise record of *P. explorator* in the Bay of Arcachon seem to support such a hypothesis as there exist special temperature conditions in the bay (BOUCHET & REAL, 1969 : 5).

ETYMOLOGY. — In latin "explorator" means explorer or pioneer. This new species has earned the title by being the first of the *Parhyale* genus to be reported in the North Atlantic Ocean.

#### KEY TO THE SPECIES OF *Parhyale*

The key proposed by BARNARD (1979 : 120) is used herein. The key is developed using all species found to date.

1. Outer ramus of uropod 3 with 1 or more spines located on dorsal margin disjunctly from apical spines ..... 2  
    All spines on outer ramus of uropod 3 apical and contiguous ..... 4
2. Peduncle and flagellum of antenna 2 with numerous short tufts of marginal setae. *P. plumicornis*  
    Peduncle and flagellum of antenna 2 sparsely setose ..... 3
3. Propodus of male gnathopod 2 pyriform, posterior margin much shorter than palm .....  
    ..... *Parhyale? zibellina*  
    Propodus of male gnathopod 2 subrectangular, posterior margin as long as palm. *Parhyale? iwasaï*
4. Propodus of pereopod 7 with posterior spines ..... 5  
    Propodus of pereopod 7 naked posteriorly ..... 8
5. Peduncle of uropod 1 with enlarged apicolateral spine ..... 6  
    Peduncle of uropod 1 without enlarged apicolateral spine ..... *Parhyale. sp.* Sivaprakasam
6. Pereopods with normal size of the genus. Flagellar articles of antenna 1 usually with 2 aesthetascs each one ..... 7  
    Pereopods longer than normal size of the genus. Flagellar articles of antenna 1 each usually with 1 aesthetasc ..... *Parhyale multispinosa*

7. Propodus of male gnathopod lightly broad distally. Epimeral plates 2-3 sharp posteroventrally. Outer ramus of uropods 1-2 with 2-3 and 1-2 dorsal spines ..... *Parhyale basrensis*  
 Propodus of male gnathopod 2, narrow distally. Epimeral plates 2-3 almost quadrate perfectly, except a posteroventral little process. Outer ramus of uropods 1-2 with 2 and 1 dorsal spines.  
 ..... *Parhyale hawaiiensis*
8. Outer ramus of uropod 1 naked dorsally ..... 9  
 Outer ramus of uropod 1 spinose dorsally ..... 11
9. All rami of uropods 1-2 naked dorsally, inner ramus of uropod 3 fused to peduncle .....  
 ..... *Parhyale eburnea*  
 Some rami of uropods 1-2 spinose dorsally, inner ramus of uropod 3 fully articulate .... 10
10. Male antenna 2 with dense elongate brushes setal on peduncular articles 4-5, male gnathopod 1 with sharp taper near defining corner of palm ..... *Parhyale penicillata*  
 Male antenna 2 lacking setal brushes, male gnathopod 1 with scarcely any or no taper near defining corner of palm ..... *Parhyale fascigera*
11. Basis of peraeopod 7 with broadly rounded posteroventral lobe ..... 12  
 Basis of peraeopod 7 with narrowly conical posteroventral lobe. *Parhyale* sp. of BULYCHEVA
12. Peduncular article 5 of antenna 2 and first flagellar articles with dense elongate tufts of plumose setae ventrally; peduncle of uropod 1 with enlarged apicolateral spine. *Parhyale explorator* n. sp.  
 Peduncle and flagellar articles of antenna 2 with few spiculate setae. Peduncle of uropod 1 without apicolateral spine ..... *Parhyale aquilina*

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